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OPERATIONS

MILITARY TRAINING PAMPHLET No. 23

PART I.—GENERAL PRINCIPLES, FIGHTING TROOPS AND THEIR CHARACTERISTICS

1942

[The pamphlet supersedes the 1939 edition, with supplement]

Prepared under the direction of
The Chief of the Imperial General Staff

THE WAR OFFICE
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PREFATORY NOTE

Military Training Pamphlet No. 23—Operations—is the main title of a series of pamphlets which will contain the latest ideas on subjects dealt with in Field Service Regulations, Volume II, 1935.

Pamphlets already issued are :

Part I—General principles, fighting troops and their characteristics.

II—Defence.

III—Appreciations, orders, intercommunication, and movements.

IV—Protection.

V—The use of gas in the field.

VI—Withdrawal.

VIII—River crossings.

IX—The infantry division in the attack.

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CHAPTER I

GENERAL PRINCIPLES

1. Introduction

1. The efficiency of an army depends on certain essentials, which may be summarized as :—

i. Powers of leadership on the part of commanders of all ranks.

ii. High fighting qualities on the part of the troops of all arms.

iii. A high standard of training.

iv. A balanced organization.

v. An efficient and up-to-date equipment.

2. Leadership

1. Leadership depends on simple and straightforward human qualities. A leader must have the confidence of his men. He will gain it by commanding their respect. To do so, he must possess intelligence, commonsense, determination, enthusiasm, energy, and tact. He must display a sense of justice and a sense of humour ; cheerfulness in the face of difficulties ; readiness to share his men's hardships, and indifference to personal danger ; initiative, and readiness to take responsibility ; and an obvious pride in his command.

2. Above all, he must possess confidence in himself. This will be dependent on his having a thorough knowledge of his profession and a sound military judgment. These can be acquired only as the result of study and experience, and they

comprise the ability to apply to the ever varying conditions and situations of war those principles which experience has proved to have a dominating influence on military operations.

3. Every leader must possess a trained imagination. The higher the command, the more important is this quality. A trained imagination is necessary to enable a commander to gauge the qualities and intentions of the enemy, to visualize what will be the effect of his orders on the force under his command, and to give proper weight to the varying conditions under which the troops will have to move or work or fight.

Without a trained imagination, no commander will be able to gauge the fighting qualities of his troops ; and, unless he can do so, he will not be capable of making the best of these qualities and of maintaining the morale of his command.

3. The Principles of War

1. The study of military history has established that the actions of successful commanders have been governed by certain principles which can be clearly defined. These principles are not rigid laws, but they provide a guide on which military action should be based. The value of individual principles varies constantly according to the circumstances. It will frequently be found that the application of one principle to a situation involves at least the partial breach of another. A highly trained military judgment is required to decide the relative importance of the various principles on each occasion.

2. *Maintenance of the object.*—In any operation, great or small, it is the duty of every commander, whatever the size of his command, to define clearly to himself the object which he seeks to attain, and thereafter to allow nothing to distract him from it.

3. *Concentration.*—This principle involves the employment of all available means, physical, moral, and material, on the task in hand at the decisive place and time.

4. *Economy of force.*—Economy of force is a corollary of concentration, since the latter can be obtained where and when required only if the strictest economy is practised in the allotment of resources to those areas where a decision is not at the moment sought.

5. *Offensive action.*—The ultimate overthrow of the enemy demands offensive action. A successful defensive may wear the enemy down, but, unless followed by offensive action, it can result at the best only in a stalemate. The offensive gives moral superiority, and tends to confer the initiative and, with it, liberty of action.

6. *Surprise.*—Surprise is the most powerful and effective weapon in war. To surprise the enemy is often a decisive means of achieving victory.

7. *Security.*—Success in war can be obtained only if liberty of action is assured. Security consists in making provision against enemy action which might prejudice the liberty of action of the force.

8. *Co-operation.*—It is only by the active co-operation of all the components of a force that its full strength can be developed.

9. *Mobility.*—Mobility is essential to enable a force to be concentrated or dispersed, to achieve surprise, to provide security, and to assume the offensive.

4. Strategy

The application of these principles to strategy is dealt with in Field Service Regulations, Vol. III—" Operations—Higher Formations."

5. Tactics

1. Tactics are the methods of handling military forces in battle in accordance with the principles of war, and resolve themselves into the common-sense application of weapons to ground.

The application of the principles to the situation and the problems of the battle-field is dependent on a multitude of varying factors, such as ground, weather, the time of year, the characteristics of the troops, armaments, and so forth. The tactics to be employed will therefore seldom be twice the same.

A commander must be so imbued with these principles that it becomes a matter of instinct for him to seek their natural application to the problem in hand.

2. *Fire* dominates the battle-field. Fire is the chief antagonist of mobility. To retain the power of mobility, it is necessary to overcome the enemy's fire. The use of ground, darkness, or smoke are all means towards the attainment of this object; but, in the end, it will nearly always be necessary to neutralize the enemy's fire-producing weapons by the application of superior fire.

3. The application of the principle of *concentration* entails concentration of will power, of effort, of fire, and often of troops at the point at which the decision is to be obtained. Concentration of fire can, however, often be obtained while the troops applying the fire remain dispersed.

4. Secrecy ensured by concealing preparations or disguising intentions, together with rapidity of execution, are the principal measures whereby *surprise* can be achieved. The result of surprise is fleeting; it is, therefore, essential to take the fullest advantage of its effects while they last. Where complete surprise is not possible, partial surprise, i.e., surprise in time or place, or by the employment of new methods or new equipment, or by concealment of the details of dispositions, may have a far-reaching influence in war.

5. To obtain *security*, it will usually be necessary to employ a portion of the force to guard what is vital and to provide protective detachments so that the force may move in safety and rest undisturbed.

Offensive action, or the threat of it, may in itself provide some measure of security, since it involves retention of the initiative.

The wide radius of action of enemy armoured forces, the ever-present threat of attack by airborne troops, often far from the fighting zone, and the possibility of action by " fifth columnists," all demand a high degree of security on the part of all formations, units, and installations, both operational and administrative, wherever they may be situated.

6. To ensure effective *co-operation*, it is essential for commanders of all grades to know the capabilities and limitations of the various components of a force and to apply that knowledge in the formulation of their plans, and in the execution of their tasks. The characteristics of the fighting arms are discussed in Chapter II.

7. Mobility is dependent not only on the marching qualities or equipment of the army, but also on the ability of its commanders to make sound and rapid decisions, on the efficiency of the machinery for transmitting these decisions to the troops, and on the training of the latter in their rapid execution.

8. To know when and where to concentrate, when and where to economize—in fact, how to distribute the force available; to balance the requirements of a reasonable security on other parts of the field with the necessity to concentrate all possible strength where a decision is being sought; to decide to what extent surprise is essential, and to what extent it must be sacrificed to ensure the necessary concentration of effort at the decisive place and time; these are a large part of the art of command, and they require experience, judgment, and powers of decision.

6. The Plan

1. For every operation a *plan* is necessary ; a commander cannot make a plan until quite clear in his mind as to what his object is. In making any plan, proper weight must be given to considerations that may affect the attainment of the object for which the plan is made. Such considerations are dealt with in paras. 4 to 8 below.

2. Plans will vary from those for the employment of large forces, which may take days or even months to frame, to plans for the immediate employment of the smallest sub-unit, where the plan may have to be formed and the necessary orders issued in a matter of minutes.

The reasoning process is the same in both cases, although in the former it will usually be committed to paper as a written appreciation of the situation, whilst in the latter it is purely mental summarizing of the conditions of the moment. The making of appreciations is dealt with in Part III—" Appreciations, Orders, Intercommunication, and Movements."

3. **The most important quality of every plan is simplicity.** Each plan should be as simple as possible, taking into account the nature of the operation to be undertaken, and it should require of the troops the simplest and most straightforward action possible in furtherance of the object.

Complicated plans involving complicated manœuvres or complicated methods of applying fire are inherently liable to failure.

4. Full weight must be given to the time factor, and time saved is time lost to the enemy. Some time is, however, always necessary for the preparation of plans, and undue haste at the expense of adequate preparation may result in failure.

5. *Information.*

i. The *information* at his disposal is the basis of any plan made by a commander in the field. To make the best possible arrangements, he must be provided with as accurate and up-to-date information as possible regarding :—

(*a*) the numbers, moves, morale, and intentions of the enemy ;

(*b*) the position and state of his own troops and the scale and nature of aircraft supporting him ;

(*c*) the nature of the ground over which he is to operate ;

(*d*) the scale of hostile air attack he may expect.

ii. Information about the enemy can never be complete, nor is it likely to be entirely accurate or up-to-date, however good and careful the arrangements made to obtain it. A commander must realize that he will usually have to act on imperfect knowledge of the situation, but it is his business to seek continually by every means in his power to supplement, confirm, or correct his information. On the other hand, to postpone action, when action is required, in order to await fuller information, will lead to the loss of valuable time and to the risk of failure. No commander who waits for his information to be complete will ever make a plan at all.

iii. Information about his own troops is mainly a matter of good intercommunication and a high standard of training.

iv. Information about the scale and nature of air support again will affect all tactical plans, particularly during periods of rapid movement, when air support may largely take the place of artillery.

v. Information about the ground will be obtained in the first instance from the study of maps, whenever available, and of air photographs. Ability to read a map properly, i.e., to visualize the ground and its tactical properties, is a quality that every commander must cultivate. He must also know what information can be obtained from air photographs with the staff and equipment available for the purpose. Such information must, whenever possible, be supplemented by the personal reconnaissance of commanders. The importance of this personal reconnaissance, although always great, decreases as the size of the force increases.

vi. Information about the scale of hostile air attack to be expected will always have the greatest influence on a commander's plans.

vii. The methods employed to gain information are described in detail in " The Manual of Military Intelligence in the Field."

6. *Ground.*—Of the various considerations which have to be taken into account in framing a plan, *ground* has on every operation a dominating influence. No two areas of ground are identical ; every area therefore requires special consideration. Constant study is necessary to appreciate the influence of ground on the various phases of the battle. Facilities for observation, positions from which to provide supporting fire, facilities for movement and obstacles to it, cover both at rest and in movement, are all dependent on the ground. The proper use of ground is therefore a most important factor in all

tactical operations. An "eye for ground" is an essential attribute for all military commanders, and one which can be acquired only by constant practice.

7. *Execution of the plan.*—Even when a sound plan based on good information has been made, there will be a continual succession of unforeseen incidents and obstacles which tend to impede a commander in accomplishing what he has set out to do. Such obstacles may occur even though the greatest foresight has been exercised; the enemy does something unexpected; an important message is not delivered; some turn of the weather upsets calculations; a subordinate leader becomes a casualty; and so forth.

Further, in the course of any operation, demands for reinforcements to meet some fresh emergency are always being made on the commander; he must know how far to resist or to satisfy these demands.

Through all these distractions, the object must be kept clearly in mind and the plan carried through with determination. A sound plan carried to its end with sturdy determination will achieve far greater results than a perfect plan in the execution of which the commander is induced to hesitate by the distractions which are the current coin of battle.

8. *Reserves.*—As one of the means by which he influences the battle, a commander retains in his own hand a reserve to be employed at his discretion for the furtherance of his plan.

Reserves are also necessary to meet the unexpected. Under this heading are included reserves of troops, reserves of moral strength and physical energy, and reserves of material of all descriptions.

As reserve troops are thrown into battle, new reserves should be formed from those troops who are liberated from the contest. They should be rested and, if necessary, re-equipped. Reserves are, however, intended to be used, and the commander who fails to attain his object, while still possessing reserves whose employment would have turned the scales in his favour, has failed in one of the most important duties of command.

7. Command and Control in Battle

1. The qualities required of a leader have been stated in Sec. **2**. The principal duty of a commander is to make decisions, and to issue orders, either directly or through the medium of his staff, to give effect to these decisions. It is essential that a commander shall make his intention clear to his subordinates. This intention will usually best be expressed by a clear statement on the task which he proposes

shall be performed by his whole command. By this means alone can subordinates be placed in a position where they are able to appreciate how best they can act intelligently and employ the means at their disposal to further the interests of the higher commander's plan.

2. A commander will allot definite tasks to his subordinates, who, within their individual scope, will use their own initiative in arranging the methods by which they will perform them.

8. The Staff

1. Commanders of formations and units are provided with staffs to assist them in the formulation of their plans, and the issue of orders to give effect to these plans. The first duty of the staff is to assist the commander by every means in its power; its second duty is to ensure the welfare, maintenance, and comfort of the troops. The staff assembles the information on which the commander's plan is formed and keeps him informed of the situation. It conveys to the troops his orders and instructions. It keeps the commander informed regarding the requirements of the troops and makes arrangements for their supply and maintenance.

2. It is the duty of a staff officer to advise his commander if required to do so; or to offer advice if, in his opinion, it is desirable that such advice should be tendered. The staff of any formation or unit must work together as a team. The importance of this task is great and requires high qualities on the part of the staff. Staff officers must be highly trained, and must be entirely loyal, tactful, and self-denying. Should a commander make a decision against the advice of his staff, the staff must work loyally and wholeheartedly to implement that decision.

9. The Fighting Qualities of the Troops

1. The final test of an army is its fighting spirit, which is its resolution to defeat the enemy. The fighting spirit of a formation or unit is founded on enthusiasm for the cause for which the soldier is fighting, and on the personality of its commander and his powers of leadership. From this foundation are developed those moral qualities in the troops themselves which are conveniently grouped under the term morale. In this respect, regimental and corps tradition play an important part.

2. The methods adopted by commanders must be such as will take the fullest advantage of the inherent qualities of the troops. Nations have individual characteristics which should be exploited to the full, and commanders must study these characteristics and adapt their methods to make the most of them.

3. The morale of an army is built up in the first place on the confidence of the individual soldier in his equipment, his training, his leaders, and consequently in himself. In modern war no army composed of troops who are lacking in such confidence can hope to be successful in battle.

4. Morale is also dependent on the maintenance of a high standard of mental and physical fitness. Conditions of modern war demand that the soldier shall be intelligent, adaptable, and capable of acting on his own initiative, and that he shall have a sound mind and a fit body. Mental fitness is largely a matter of training. Physical fitness and therefore mental alertness are to a large extent dependent in the field on a full realization of the requirements of the human body.

5. The mental and physical fitness of the troops must receive the continuous attention of every commander in the field. They are dependent on the care of health, adequate sleep, adequate periods of rest from mental strain and physical exertion, and the supply of adequate nourishment in its proper form.

6. At all times, and particularly in times of stress in battle, these qualities are held together by discipline, which is the ingrained habit of obedience to orders and the bedrock on which all training is based. In the British Army, where the individual soldier has to use his reason and intelligence, the object and purpose of orders should usually be made clear if a cheerful and unhesitating obedience is to persist. At the same time, all ranks must be trained to obey unquestioningly and unhesitatingly any order which, in the interests of security, cannot be explained to them. Discipline is based on the habit of unselfishness and displays itself in complete self-control, self-respect, loyalty, and ultimately in self-abnegation for the sake of the cause.

10. Training

1. The object of all training is to fit the Army for war.

2. The training of leaders of all grades and their staffs is essential to the training of the Army as a whole, and involves providing them with knowledge and continual practice so that they are able :—

i. to instruct their subordinates ;

ii. to lead them in battle ;

iii. to utilize the personnel and material at their disposal to the best advantage.

3. The first step in the training of the soldier is the inculcation of discipline. This is done through the medium of drill, physical training, mental training, and the inculcation in the man of pride in his unit and in himself.

Physical training is also valuable for the development of physique and for the attainment of quickness in hand and eye. Mental training is directed towards teaching the soldier to think for himself and to act intelligently in the field when thrown on his own resources.

To give the soldier the self-confidence which is essential, he must be highly skilled in the use of his arms and the equipment which he employs. He must be qualified to give his equipment proper care and maintenance, and must realize the necessity for it. He must be so practised that he will instinctively use his weapons to the best advantage.

In war, the fighting man needs many of the instincts of the primitive hunter, and the more these are developed, the more efficient will he be. Although these qualities are elementary, the conditions of modern life in peace call them into play to a very limited extent. Fieldcraft must, therefore, form part of the soldier's training, and it should be begun at the earliest moment. The soldier must learn to make use of ground, to conceal himself in movement and at rest, to remain motionless for long periods, and to see without being seen. He must be accustomed to work in the dark and to sleep in the daylight.

4. Every officer and man must realize that the responsibility for training and practice rests largely with himself.

5. The training of the Army involves not only the training of the individual but also the collective training of units and formations so that efficient co-operation is assured.

6. Training in peace is carried out under the instructions contained in Training Regulations and the manuals of the arms. In war, the harder school of experience is brought into play. The higher and more imaginative the standard of training in peace, the less exacting are likely to be the lessons of war. Every war provides new problems, which have not been foreseen by the most far-seeing. Further, war through its inevitable casualties is continually changing the personnel of units and formations. Training must be continued whenever opportunity offers, so that new lessons and new tactical doctrines can be quickly disseminated, and so that units and formations can maintain their cohesion as efficient fighting machines.

11. Organization

1. For an army to form an effective weapon in a commander's hand, it must be suitably organized, as must the formations and units of which it is composed. Every organization should be flexible and should be so designed that the best advantage can be taken of the inherent qualities of the arm or combination of arms concerned.

2. Flexibility is required to secure concentration of effort under higher commanders at the decisive place and time, and yet to allow of some decentralization of command should the situation demand such action. To break up an organization inevitably involves difficulties of command and of administration and is therefore to be avoided whenever possible.

3. The number of subordinates whom any one commander can control is limited, and formations and units should be so organized that commanders are not burdened with a larger number of subordinates than can be efficiently commanded. Experience shows that a commander will have difficulty in controlling more than six subordinates.

4. The general principles of the organization of the Army are laid down in Field Service Regulations, and the details in War Establishments.

12. Equipment

1. An army which is to enter the lists in modern war must be equipped with all the latest weapons of war and fully trained in their use and maintenance. A new arm and new equipment, or a modification to one already in existence, have a direct influence on the tactics to be employed. The effect of every innovation must therefore be studied, to ensure that its employment is such as will most effectively allow of the application of the principles laid down in Sec. **3**, above.

CHAPTER II

FIGHTING TROOPS AND THEIR CHARACTERISTICS

13. Introduction

As a first step to proper co-operation, all officers must understand the capabilities and limitations of the various arms.

14. Armoured Formations

1. Both the mobility and the comparative invulnerability of the tank make it a most powerful weapon in the hands of a commander. Armoured formations are the primary means of gaining a decision in the attack or of regaining the initiative in defence. They can be committed to battle and quickly disengaged, and thus possess a quality of mobility denied to all unarmoured formations.

Tanks have considerable cross-country capacity and can crush or cross wire entanglements. They combine almost complete protection against rifle and machine gun fire with mobility and with the power to deliver a considerable volume of fire on the move. They are less vulnerable to air and to gas spray attacks than are other troops. They aim to achieve their purpose by fire power and by their effect on the morale of the opposition. On the other hand, tanks are vulnerable to direct artillery fire, and, in varying degree, to the fire of anti-tank weapons. Their movement across country is limited by water obstacles over a certain depth, by thick woods, by swampy or rocky ground, and by trenches of more than a certain width and depth. Their distinctive appearance and their track marks on the ground make them easily recognizable from the air in most types of country, and the characteristic noise made by the larger types may give warning of their approach. When closed down, their field of vision is limited, and the strain on the crew is severe.

The principal means of intercommunication between tanks of all types is wireless.

2. Tanks are classified as army, cruiser, close support, and light.

3. *Army tanks* are heavily armoured and are immune both from small arms fire and from the smaller anti-tank guns. They are armed with an anti-tank gun in addition to one or more machine guns; but they are comparatively slow in movement. They have a good cross-country performance.

4. *Cruiser tanks* are less heavily armoured than army tanks, but have a greater speed. Their armament and cross-country performance are similar to that of the army tank.

5. A proportion of army and cruiser tanks are equipped with a 3-inch howitzer to enable them to afford close support to tank formations and units. The 3-inch howitzer fires either smoke or H.E., the smoke forming a screen behind which the other tanks are able to manœuvre.

6. *Light tanks* are designed for rapid and sustained movement, mainly in a reconnaissance role. Being lightly armoured they are suitable for attack against unarmoured troops, headquarters, or installations in the open.

7. *Armoured cars* have a greater speed on roads or over level ground than tanks and are as silent in movement as an ordinary motor car. They are lightly armoured and mount machine guns of heavy and light calibre, or a Q.F. gun and a machine gun. Their cross-country capacity over open country is considerable ; but they have only a limited capacity to surmount obstacles. They are most suitably employed, therefore, in areas well provided with roads, or on open plains or deserts with hard surfaces. These characteristics make them suitable for long distance reconnaissance.

8. *Armoured formations* are of two types, armoured divisions and army tank brigades. Both are inherently similar in that they are essentially offensive weapons and are not suitable for static roles. They are designed for action against hostile tanks, the destruction of which, when encountered on the battlefield, will be their primary role.

9. *The armoured division* is a self-contained formation of all arms, capable of independent action in addition to co-operation with other formations. It is not suited to attacks against organized defensive positions, but can exploit successes gained by army tank brigades and by other arms. Armoured divisions are normally composed of cruiser tanks ; but they may, in some circumstances, be equipped with army tanks.

10. *Army tank brigades*, which are equipped with army tanks, are intended to assist the other arms in the attack, or to regain the initiative by counter-attack in defence. When employed in this role they may be the predominant partner, in which event all available support must be directed towards assisting their advance. On occasion, when a favourable opportunity presents itself, army tanks may be used boldly in an independent role with little or no support from the other arms.

15. Infantry

1. *Infantry* may operate on its own, supported as necessary by one or more of the supporting arms ; it may be the predominant partner in co-operation with army tanks ; or it may take part in an operation in which the tanks are predominant. The infantry in an armoured division functions as a supporting arm to the tank formations and units.

Infantry, generally, will be employed on those tasks for which armoured formations are unsuited, e.g., attacking an organized defensive position, often in co-operation with army tanks ; fighting by night or in country generally unsuitable for A.F.Vs. ; holding ground gained ; and occupying a defensive position.

Infantry is the most adaptable of all arms, since it is capable of operating over almost any ground either by day or night, and can find or make cover for itself more readily than most other arms.

2. Besides the infantry battalions which comprise the infantry brigade, infantry is organized in reconnaissance, machine gun, motor, and parachute battalions.

3. The principal weapons within the infantry battalion are the L.M.G. and the rifle. Other infantry weapons include anti-tank rifles, 3-inch and 2-inch mortars, twin A.A.L.M.Gs., and grenades. Particulars of infantry weapons are given at Appendix A.

Infantry battalions include a carrier platoon, which consists of armoured carriers and motor cycle solos and combinations. The characteristics of this platoon are its ability to move rapidly across suitable country, and the considerable degree of protection against small arms fire afforded by the carriers.

4. Although infantry transport is mechanized, the movement of an infantry battalion is slow, since the men march. Infantry which can be carried to the battlefield in mechanical transport will secure a great advantage in freshness and vigour, besides an increase in range.

The mobility of infantry in battle is dependent on adequate arrangements for keeping its load light. Small bodies of infantry may be transported by aircraft, but will have little mobility at the scene of action unless adequate arrangements have been made for the provision of transport, and for their maintenance on arrival.

5. The volume of fire that its weapons can develop, the ability of its L.M.Gs. to maintain fire on fixed lines or on fixed arcs in darkness or in smoke, and the ease with which it finds cover and concealment, make infantry very strong in defence against unarmoured troops. The infantryman must, however, be well trained in camouflage and concealment, in the use of ground and entrenching tools, and in the erection of obstacles. On the other hand, infantry is vulnerable to attack by A.F.Vs. It must, therefore, learn to take full advantage of every accident of the ground and of all available

anti-tank weapons and mines to transform its defensive position into anti-tank localities, whether or not there is a tank obstacle across the whole front. The effects of air attack must be minimized by dispersion, by concealment and camouflage, and by the avoidance of small, isolated areas of cover which are likely to be bombed.

For success in the attack against an organized defensive position, infantry depends on army tanks and on assault parties to make passages through obstacles; on the skilful use of ground to secure surprise; and on air support, artillery, and mortar fire to neutralize the fire power and to lower the morale of the defenders. On the other hand, against an enemy whose morale is low, whose armaments are inferior, or whose defensive position is not organized, enterprising and skilful infantry may advance under cover of its own weapons.

6. *Reconnaissance battalions* are included in infantry divisions to provide a means of reconnaissance. They are armed with the same weapons as rifle battalions.

Each reconnaissance company contains scout platoons, made up of reconnaissance cars and carrier sections, backed up by a truck-borne infantry platoon.

The reconnaissance cars and carriers are protected against small arms fire, but are vulnerable to anti-tank weapons; while vehicles of the infantry platoons are vulnerable to small arms fire. The unit is fully mobile, although the trucks of the infantry platoons are generally restricted to roads. The role of the unit is primarily one of reconnaissance, and its considerable offensive power enables it either to fight for information in the advance, or to delay the enemy in a withdrawal.

7. *Machine gun battalions* are fully motorized but unarmoured. One such battalion is included in each infantry division.

The chief characteristic of the M.M.G. is its power to maintain accurate and sustained fire up to a range of 2,000 yards, at which range located enemy targets can effectively be neutralized; while with streamline ammunition effective harassing fire can be produced up to 4,500 yards. Provided that certain preparations are made in daylight, the accuracy of fire can be maintained during poor visibility, even though the guns have not been put into position in daylight. M.M.Gs. can also carry out accurate indirect fire from concealed positions.

These characteristics make the M.M.G. primarily a weapon of defence. In the attack, its most important functions are flank protection and consolidation of positions captured. The

mobility of M.M.Gs. enables them to be sent forward with other arms to seize and hold important tactical features ahead of a division in the advance.

8. *Motor battalions* are included in armoured divisions. They are organized and equipped with special transport to permit the maximum mobility and flexibility. Each company contains its own reconnaissance element in the form of a scout platoon carried in scout cars and carriers, and is administratively self-contained, unlike the rifle companies of an ordinary infantry battalion.

The main role of a motor battalion is to restore mobility to armoured units held up by anti-tank defences or by tank obstacles. Other tasks include mopping up, taking over and holding ground seized, and protecting armoured units at night.

9. *Parachute troops.*—Although essentially these are infantry, they are dealt with under Airborne troops, in Sec. **21**.

16. Artillery

1. Artillery is essentially an offensive arm, and no large scale plan of attack can hope to succeed without full consideration being given to its best employment. In defence, artillery is also used offensively, to destroy enemy concentrations, batteries, etc., and in support of our own counter attacks.

2. Artillery in the field is classified as mountain, field (including horse), anti-tank, medium, heavy, super-heavy, and anti-aircraft. All except mountain are mechanically drawn. Artillery is normally allotted as follows: a proportion of the field, anti-tank, and light anti-aircraft artillery regiments form the divisional artillery; the remainder of the field artillery is organized into army field regiments under higher command as a reserve, and allotted to formations as required; medium, heavy, super-heavy, heavy anti-aircraft, and some light anti-aircraft artillery are under corps or army control, but a proportion of medium artillery and of heavy anti-aircraft artillery is sometimes decentralized to divisions.

3. The employment of the various natures of artillery ammunition may be summarized as follows: H.E. shell is fired by all natures, with the exception of anti-tank artillery. It is the most generally useful shell for the infliction of casualties among personnel and for the destruction of aircraft, weapons, entrenchments, buildings, or cover of any description. Smoke shell is fired by field artillery to provide smoke screens as required. Gas shell may also be used. Anti-tank,

field, and anti-aircraft artillery are provided with armour piercing shot for the engagement of A.F.Vs. Particulars of artillery weapons are given at Appendix B.

4. The characteristics of artillery other than anti-tank and anti-aircraft—may be summarized as follows :—

i. Ability to bring effective fire on to the enemy at long ranges.

ii. Flexibility, which implies the power of concentration or dispersion of fire.

iii. Ability to disengage during battle and to reinforce other sectors as required.

5. This flexibility of fire and movement can be employed in three main ways : to concentrate the fire of the artillery at the decisive place and time, to provide a reserve of fire in the hands of the commander, and to effect surprise both in attack and defence.

6. Certain factors must, however, be considered in the practical application of these characteristics. Guns must be well forward if full advantage is to be obtained from their range. Their capacity for shooting over a wide front is, however, reduced as compared with guns sited farther back. Concentration of fire cannot be applied rapidly to various portions of the front unless the guns are centrally controlled.

7. A dominating principle which should govern the application of artillery fire is concentration. The command of any body of artillery should therefore be vested in the highest commander who can exercise effective control. When the command of artillery is centralized, it will be normal to place all or part of it " in support " of the formation or unit whose front it covers. The commander of artillery " in support " of a formation or unit acts as liaison officer for his immediate artillery superior and is responsible that the latter is kept informed of the requirements of the situation on his own front.

When, however, centralized control of artillery cannot be effective, as will often happen in mobile warfare, the artillery must be decentralized, and units or sub-units will be placed " under command " of lower formations or even of units.

8. Artillery fulfils its role in three main ways :—

i. *Interference*, to cause casualties, to shake the enemy's morale, and to interfere with his mobility.

ii. *Neutralization*, to stop the fire of enemy weapons.

iii. *Destruction*, to destroy enemy defences and material such as guns, dumps, railways, and bridges.

9. Artillery is normally dependent for fire effect on observation of the target, but targets once " registered " (i.e., ranged on by actual shooting) can be engaged with a reasonable degree of accuracy without further observation. In certain conditions when the positions of guns and targets have been exactly determined by survey, or when large scale maps are available, artillery can open accurate fire without observation or previous registration, and can thus obtain surprise effect ; this is known as predicted shooting. Since survey work takes time, the relative importance of speed or secrecy must be taken into account in deciding whether to open with registered or predicted fire. In shooting by prediction, observation is desirable to enable errors to be corrected.

Since artillery is normally placed in indirect positions—i.e., out of sight of its targets—observation must generally be carried out at some distance from the guns. The selection of observation posts (O.Ps.) and the establishing of communication between the O.Ps. and the guns are often determining factors in the time taken by artillery to open fire. Observation from the air is usual when ground observation is not possible or is difficult, especially for counter-battery work or long range fire.

Fire over open sights, when the target is visible from the gun, will always be employed against A.F.Vs., and all field and anti-aircraft guns must be prepared to engage enemy tanks in this manner. Field artillery will be sited to provide depth in anti-tank defence. When there is a considerable threat of attack by strong armoured forces and the anti-tank reserves are considered inadequate, a proportion of field guns will be sited primarily for anti-tank defence. Under these circumstances guns will be sited singly and cannot carry out their normal tasks. The commander must lay down the number of guns to be so employed in each case.

10. *Anti-tank artillery* is organized in regiments. The anti-tank gun is a direct fire weapon firing a shell of high velocity with a flat trajectory. The effectiveness of anti-tank artillery will depend on the facilities for concealing the guns and for siting them so as to make full use of their flat trajectory. The fire of anti-tank guns will be held until a direct hit with the first round is almost certain.

11. *Anti-aircraft.*—The main equipment of anti-aircraft units in the field is of three types :—

i. Heavy anti-aircraft guns, which provide defence against high level bombing or high dive bombing aircraft. They may also be employed in secondary roles against tanks and troops. They fire a shell, burst by time

fuze, up to a considerable height, and, in addition, a small proportion of armour piercing ammunition is carried for use against A.F.Vs.

ii. Light anti-aircraft guns, which provide defence against dive bombing or low level bombing aircraft, or, as a secondary role, against tanks. They have a very high rate of fire and a small shell which bursts on percussion. The shell has also a self-destroying device which acts after a given time of flight. In addition, a small proportion of armour piercing ammunition is carried for use against A.F.Vs.

iii. Searchlights, which are used to illuminate hostile aircraft at night, both for anti-aircraft guns and to assist our own fighter aircraft. Different methods are employed in each case.

Anti-aircraft guns and searchlights are employed in considerable numbers, disposed on a co-ordinated plan for the protection of an area. New methods enable anti-aircraft guns to engage unseen targets.

Light anti-aircraft guns may be disposed singly, but will normally be deployed in one or more troops of four—the troops being the tactical unit—for the protection of a vulnerable point. All units are mobile, and the light anti-aircraft gun can come into action on the move very quickly.

17. Engineers

1. Military engineers are technically trained and equipped to apply science and engineering skill to the needs of the army. They should be used for the technical work for which their specialized training and equipment fit them ; not for simple engineering work in the field which is the normal duty of all arms. Field units are trained to fight but carry a lower scale of automatic weapons than infantry ; their use as infantry is uneconomic except as a last resource. Their skill in handling explosives and their fighting training fit them to partake in the assault against prepared positions, and in this role they may rightly be used in the forefront of the battle.

All R.E. units are trained to defend themselves against attack by ground and air forces. They are also trained in the construction of protective earth works, obstacles and minefields and in demolitions. The use of specialist L. of C. and transportation units for such tasks is, however, a waste of their special individual qualifications.

2. Engineer problems demand foresight in reconnaissance and in provision of tools, transport, materials, and labour, both skilled and unskilled. Commanders must inform their senior engineer officers as early as possible of their future intentions and plans and keep them in close touch with anticipated developments, in order that advice in engineering matters may be given and the foresight exercised without which the engineer plan cannot mature. Engineer reconnaissance parties will invariably accompany the forward troops. It is also the duty of other arms to provide the engineers with early information from which engineer tasks can be foreseen and set in train with the minimum delay. It may frequently be necessary to fight for engineer information.

In addition to reconnaissance for specific operations, engineers must, in co-operation with the General Staff, collect all engineer information for the sector with which they are concerned.

3. In the execution of field engineering work for which the other arms are responsible, engineer duties are advice and supply of tools and materials. Working parties of other arms are required to assist engineers in the execution of works carried out under engineer control.

4. Engineer work in the field calls for a measure of specialization, and staffs should know the type of unit suitable for particular engineering tasks. The principal types of unit and their functions are :—

i. *Field units*

(*a*) Field squadrons and field park squadrons of armoured divisions, field companies and field park companies of divisions, army field companies and corps field park companies of army and corps troops engineers. Their principal functions include bridging, demolitions—including demolition of enemy emplacements in the assault—creation and clearance of obstacles and booby traps, fortification of villages, concrete and semi-permanent defences, development of water supplies and communications, and disposal of unexploded bombs which can be detonated in situ. These units are fully motorized.

(*b*) Chemical warfare groups and companies whose primary role is the offensive use of gas. They can undertake all field engineering except wet bridging, but carry a limited amount of tools and equipment.

(*c*) Field survey companies who are responsible for mapping and field survey, including provision of trigonometrical data for the R.A. survey organization.

ii. *Line of communication units*, which are not fully mobile.

(*a*) Construction units, whose functions are construction of semi-permanent accommodation, installations, aerodromes, and roads.

(*b*) Electrical and mechanical units, whose functions are the operation and maintenance of engineer electrical and mechanical plant.

(*c*) Store holding units and engineer services.

(*d*) Postal units.

(*e*) Specialist units raised for specific tasks which are implicit in their titles, such as forestry, mechanical equipment, tunnelling and bomb disposal.

iii. *Transportation units*

(*a*) Railway units who construct, operate, and maintain all military railway services in the theatre of operations.

(*b*) Inland water transport units who operate and maintain all military I.W.T. services in the theatre of operations, including port lighterage.

(*c*) Docks groups who operate port facilities.

5. Engineer resources are limited and must not be dissipated on work which is not essential. The engineers of a formation should be kept under the C.R.E. for work on a divisional plan as long as possible. When work is foreseen which requires the deployment of a portion of the formation engineers, only the minimum should be deployed ; the remainder should be retained under the C.R.E. and so placed as to be readily available where they are required. Engineers when separated from their equipment are of little value.

18. Signals

1. It is the duty of R. Signals to provide the means of intercommunication, other than postal, for an army in the field down to headquarters of regiments, batteries, and battalions. Generally, intercommunication within these units is carried out by unit signallers and orderlies. Certain types of wireless sets are manned by unit signallers. These are maintained by R. Signals personnel. R. Signals are similarly responsible for the provision of ground communications, other than point-to-point wireless, for R.A.F. formations down to squadrons.

When R.A.F. formations or units are co-operating with Army formations, R. Signals are responsible for the provision of all communications between the R.A.F. and the Army.

2. R. Signals units are allotted to divisions and all higher formations and to the lines of communication area. They each consist of a headquarters and a varying number of companies and sections designed to meet the signal requirements of the components of the formation concerned. Certain lower formations and units, such as independent brigade groups, army tank brigades and army field regiments, are also provided with signal units or sections.

3. The supervision and direction of the means of intercommunication provided by R. Signals is the duty of the General Staff, the division of responsibility between the General Staff and the signal organization being analogous to that between the staff and the services.

4. Certain R. Signals personnel wear a distinctive blue and white armband and should be given priority on the roads by other arms, as their work is usually urgent.

5. R. Signals attached to a formation are responsible for the work of the cipher personnel of that formation, and also for giving the correct official time.

19. Royal Army Service Corps

1. The role of the R.A.S.C. in the field falls into two main parts—supply and transport.

i. *Supply* embraces the provision of food and forage, petrol and lubricants, fuel and light, hospital supplies, and disinfectants.

ii. *Transport* is concerned with the conveyance of these essentials, together with ammunition, engineer and ordnance stores, and post, from railhead or from the base—if no railhead exists—to all units of a field force.

In addition to the above, R.A.S.C. units are provided for the carriage of infantry, tanks, and heavy bridging equipment. The mechanical transport of medical and certain other units is also found and operated by the R.A.S.C.

2. To enable these services to be undertaken effectively, the R.A.S.C. are responsible for the provision, repair, and

maintenance of their own mechanical transport, and for the provision and operation of animal or other means of transport when mechanical transport cannot be employed.

3. General transport companies, built up of two or more transport platoons, with the addition of the necessary ammunition, supply, composite, and workshop platoons, are allotted to divisions for the transport of ammunition, supplies, and petrol. Similar companies are allotted to higher formations and for employment in L. of C. areas, as required. Other special units are provided for G.H.Q. artillery, for anti-aircraft brigades, and for the carriage of water and bulk petrol.

4. Personnel of the R.A.S.C. are trained to fight as infantry, and R.A.S.C. units are responsible at all times for their own local defence. In view, however, of their specialized training and of the vital importance of maintaining a continuous flow of food, petrol, and ammunition, R.A.S.C. units should not be called upon to carry out a fighting role except in cases of extreme necessity or where delivery of loads can be effected in no other way.

5. The timely and rapid replenishment of units with food, petrol, and ammunition is a vital matter of considerable complexity. It is, therefore, essential that representatives of the supply and transport service should be given full and early information of intended operations, and of all estimated requirements. They must also maintain close touch with the development of the battle in order to exercise foresight in the timely provision of the requirements of the other arms.

20. Royal Army Ordnance Corps

1. The maintenance of all ordnance stores in the field is the responsibility of the R.A.O.C. The term maintenance includes the functions of provision, receipt, storage, issue, repair, and inspection.

2. Mobile R.A.O.C. units are allotted to divisions, anti-aircraft brigades, and all higher formations. R.A.O.C. units with formations include ordnance workshops, ordnance field parks, mobile laundry, and forward decontamination units. First line repairs and recovery are undertaken by light aid detachments and R.A.O.C. tradesmen such as armourers and fitters attached to units; minor repairs and replacement of assemblies and components, together with recovery to 2nd and 3rd echelon workshops, are carried out by the

divisional and non-divisional workshops. Each corps is served by a semi-mobile unit called an army ordnance workshop, which carries out heavier repairs.

3. Ordnance field parks which provide forward holding of stores in frequent demand exist mainly for the supply of spare parts and assemblies for ordnance workshops. Mobile laundry and forward decontamination units are responsible for washing clothing, and, when gas is used, the decontamination of a proportion of the protective and other clothing belonging to the formation served.

4. R.A.O.C. base installations (base ordnance depots and base ammunition depots) hold stores for issue to fighting troops and to forward R.A.O.C. units. Base ordnance workshops carry out major repairs which are beyond the capabilities of the ordnance workshops serving formations.

21. Air support

1. Assistance by the Royal Air Force to the Army may be divided into two parts :—

i. that provided by the Royal Air Force formations other than those operating under the Army :

ii. that provided by formations of the Royal Air Force placed under command of the Army. These squadrons will constitute the Army Co-operation Force.

2. Royal Air Force formations other than those of army co-operation forces, may be employed to assist the Army in the following ways, in addition to any operations undertaken to further the campaign as a whole :—

i. By fighting for general air superiority in the theatre of military operations.

ii. By the attack of targets of a strategical nature prior to the battle.

iii. By the attack of targets of a permanent nature during the battle, regardless of their location, in accordance with the general air plan drawn up jointly by the Army and Air Commanders-in-Chief for a particular operation.

iv. By the provision in emergency of reinforcements for the army co-operation force, if a greater weight of effort under the Army is considered necessary to the success of the operations.

v. *Air transport*

Assistance may be required in the transport of troops, equipment, and stores in aircraft or gliders, and by the dropping of parachute troops or supplies.

It must be borne in mind that squadrons outside the army co-operation force may not have practised attacks on fleeting targets near our own troops or have been trained in co-operation with the Army. They will usually have been trained to operate on more deliberate methods and to rely on a carefully organized communication system.

3. The army co-operation force will be employed :—

i. For reconnaissance.

ii. For the attack of targets which may arise as a result of and during the battle. Such attacks will normally be those which will have an immediate effect on the course of the operations. Either fighter reconnaissance or bomber reconnaissance squadrons may be employed, according to the nature of the target.

iii. For the reinforcement of the squadrons under R.A.F. control if not required for military operations.

The essentials for the successful operation of the army co-operation force are speed, accuracy, and flexibility.

The army co-operation force may in emergency be called on to provide local fighter cover.

4. *Fighter cover for special operations.*—However favourable the general air situation, air superiority may not be absolute, and special fighter protection may be required for a special operation.

22. Airborne forces

1. *Airborne troops* covers any force transported by air ; either parachute troops, air landing troops, or both.

2. *Parachute troops* are troops carried in aircraft and released by means of a parachute without the necessity of landing the machine. A parachute battalion has only three companies, and lacks a carrier platoon and certain other sub-units of the headquarters company which a normal infantry battalion possesses ; they have, however, a large number of 3-inch mortars.

Parachute battalions may be employed generally in two ways. First, their task may be a major one, e.g., capturing a landing ground to enable air landing troops to operate, seizing

an important tactical feature, or attacking the flanks or rear of an enemy position. The second method of employment is in a minor role, e.g., attacking headquarters and dumps, disrupting communications, or generally spreading alarm and lowering morale in the enemy's back areas.

Parachute battalions, like infantry battalions, are brigaded. Unlike infantry battalions, their companies may often operate independently, and their organization caters for this contingency.

3. *Air landing troops* are troops carried in aircraft or gliders, which must land on a reasonable landing ground to discharge their troops. Air landing troops are not specialist troops and by effecting certain modifications in existing establishments and equipment, any formation is capable of being used as an air landing force.

The normal roles allotted to an air landing force may be one or more of the following :—

i. To capture a line or focal point in the communications in rear of the enemy in order to isolate them from reinforcements.

ii. To land and attack the enemy in rear in conjunction with the advance of the main force.

iii. To capture an aerodrome.

iv. To carry out other enterprises.

The force may be required to operate in an area up to 500 miles from its home base aerodrome, and in the first instance against moderate resistance consisting of small arms fire, though subsequently it may have to meet an attack by armoured fighting vehicles. It must be prepared to be self-contained up to a period of at least three days.

A detachment of parachute troops, whose task is to secure the landing ground, will normally work in conjunction with the air landing force.

APPENDIX A.—PARTICULARS OF SMALL ARMS WEAPONS

Serial No.	Weapon	Calibre inches	Approximate weight	Service rates of fire rounds a minute			Maximum effective range—yards	Remarks
				Rapid	Medium	Slow		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	Rifle, S.M.L.E., No. 1, Mk. III	·303 in.	8 lb. 10½ ozs. (9 lb. 11½ ozs. with bayonet)	15	—	5	Approximately 1,000	
2	L.M.G. (Bren)	·303 in.	23 lb. (53 lb. with tripod)	120	—	30	From bipod—1,000 From tripod—over 1,000 if visibility permits	*Actual rates of fire of M.Gs.* 450 r.p.m.
3	Medium M.G., Mk. I (Vickers)	·303 in.	Gun with water 40 lb. Tripod, 52 lb.	250	Normal 125	—	Mk. VIIIZ Amn., 4,500 Mk. VII, 2,800	Vickers medium—500–600 r.p.m.
4	Vickers M.G., Mk. VII (Vickers)	·303 in.	47½ lb. without shoulder piece	Not applicable			Maximum on telescope No. 24—1,500	
5	Heavy M.G. (Vickers)	·5 in.	63 lb. without shoulder piece	Not applicable			Maximum on telescope No. 24—1,500	
6	Medium M.G. (Besa), Mks. I & II	7·92 mm.	Mk. I—47 lb. Mk. II—48 lb.	Not applicable			Maximum on telescope —1,500	650 r.p.m. 800 r.p.m. with accelerator
7	Heavy M.G. (Besa)	15 mm.	125½ lb.	Not applicable			Maximum on telescope —1,500	40 r.p.m.
8	Pistol, revolver, No. 2	·38 in.	1 lb. 11½ ozs.	—	—	—	50	
9	2-in. Mortar	2 in.	23½ lb. (with collimator sight)	3–4	—	—	470 (approximately) at 45 deg. elevation	
10	3 in. Mortar, Mk. II	3 in.	Barrel ... 44 lb. Bipod ... 45 lb. Base Plate ... 37 lb. Total ... 126 lb.	20	Normal 6–7	—	1,600	
11	A.Tk. rifle (Boys)	·55 in.	36 lb.	9	—	—	500	
12	Thompson sub-machine	·45 in.	10 lb.				Approximately 50	Thompson—600–700 r.p.m.

APPENDIX B.—PARTICULARS OF ARTILLERY WEAPONS

Serial No.	Classification	Equipment	Weight of shell fuzed in lb.	Maximum range in yds.			Type of ammunition used	Percentage of ammunition carried	Number of rds. per gun carried in the bty.	Speed in daylight (m.i.h.)	Rates of fire per minute					
				H.E.	Shrapnel	Smoke					Gun fire	Intense	Rapid	Normal	Slow	Very slow
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1	Mountain	Q.F. 3·7-in. How.	20 lb.	6,000	4,500	6,000	H.E. Shrapnel Smoke (India)	100%	116-HD 207-Mech	15	As fast as aimed and rounds can be fired	5	3	2	1	½
2	Field	75 mm. (French)	12 lb. 6 oz. 12 lb. 4 oz.	8,000 metres	—	—	H.E. A.P.	100%	176 12	15		12	6	4	2	—
3	Field	75 mm. (British) 18-pr. carriage	12 lb. 6 oz. 12 lb. 4 oz.	7,800 metres	—	—	H.E. A.P.	100%	176 12	15		8	4	3	2	1
4	Field	Q.F. 13-pr.	12½ lb.	8,700	6,500	—	H.E.	*100%	160	15		8	4	3	2	1
5	Field	Q.F. 18-pr.	18½ lb.	9,400 11,100 (Streamline)	6,400 —	9,400 11,100 (Streamline)	H.E. Smoke A.P.	*85% 15%	150 26 12	15		8	4	3	2	1
6	Field	Q.F. 4·5-in. How.	34½ lb.	6,600	—	6,600	H.E. Smoke	85% 15%	112 20	15		4	3	2	1	½
7	Field	Q.F. 25-pr., Mk. I	25 lb.	13,400	—	11,000	H.E. Smoke A.P. †Chem.	90% 10% — —	144 16 12	15		5	4	3	2	1
8	Medium	B.L. 60-pr. gun	60 lb. 56 lb.	15,900 15,100	15,000 14,600	— —	H.E.	*100%	100	10		2	1½	1	2/3	⅓
9	Medium	B.L. 4·5-in. gun	55 lb.	20,500	—	—	H.E.	100%	100	10		2	1½	1	2/3	⅓
10	Medium	B.L. 6-in. How.	100 lb. 99½ lb. 86 lb.	10,600 9,500 11,400	—	—	H.E. †Chem.	100%	100	10		2	1½	1	2/3	⅓
11	Medium	B.L. 5·5-in. Gun	100 lb.	16,000	—	—	H.E. †Chem	100%	100	10		2	1½	1	2/3	⅓
12	Heavy	B.L. 6-in. Gun	99½ lb.	15,900	18,600	—	H.E.	*100%	80	7		—	—	½	¼	⅛
13	Heavy	B.L. 8-in. How.	200 lb.	12,400	—	—	H.E.	100%	60	7		2	1	½	⅛	¼
14	Heavy	B.L. 9·2-in. How.	290 lb. 315 lb.	13,000 16,000	—	—	H.E.	100%	40	4		2	1	½	⅛	¼
15	Super Heavy	B.L. 9·2-in. Gun and upwards	380 lb. and upwards	24,000	—	—	H.E.	100%	80	4		—	—	1/6	1/10	1/20
16	Super Heavy	B.L. 12-in. How. and upwards	750 lb. and upwards	14,300 and upwards	—	—	H.E.	100%	120	4		—	—	1/6	1/10	1/20
17	Anti-Tank	Q.F. 2-pr., Mks. IX & X	2 lb. 6 oz.	—	—	—	A.P.	100%	142	20						
18	Anti-Tank	Q.F. 6-pr., 7 cwt.	6 lb.	—	—	—	A.P.	100%	—	20						
19	Heavy Anti-Aircraft	Q.F. 3·7-in. A.A.	28 lb.	30,000 ft. with Predictor No. 1 25,000 ft. with Predictor No. 2			H.E. Shrapnel Semi A.P.	80% 10% 10%	200	20	Can fire up to 12 r.p.g.p.m.					
20	Heavy Anti-Aircraft	Q.F. 3-in. 20-cwt. A.A.	16 lb.	20,000 ft. No. 1 Predictor			H.E. Shrapnel Semi A.P.	80% 10% 10%	200	20	Can fire up to 20 r.p.g.p.m.					
21	Light Anti-Aircraft	Q.F. 40 mm. A.A.	2 lb.	4,000 ft. No. 3 Predictor			H.E. A.P.	89% 11%	448	25	Can fire up to 120 r.p.g.p.m.					
22	Heavy Anti-Aircraft	Q.F. 4-in. A.A	55 lb.	30,000 ft. with Predictor No. 1 25,000 ft. with Predictor No. 2			H.E. Shrapnel Semi A.P.	84% 8% 8%	240	Static	Can fire up to 8 r.p.g.p.m.					

* Proportion of shrapnel may be issued until stocks used up. † Issued as required.

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